

Power Sector

Neutral Maintained

หมวดอุตสาหกรรม 3 กลุ่มหลักที่ปล่อยปริมาณก๊าซเรือนกระจก (GHG) มากที่สุดตามลำดับ ได้แก่ หมวดสาธารณูปโภค (65-103tCO₂e) หมวดขนส่งและโลจิสติกส์ (27-34tCO₂e) และหมวดวิศวกรรม (17-18tCO₂e) แต่ผลกระทบของคาร์บอนเครดิตต่อกำไรมีแตกต่างกัน โดยจากการศึกษาของเราพบว่า ผลกระทบของ Carbon credits ที่มีต่อกำไรบริษัทฯ คาดจะส่งผลกระทบต่อหมวดสาธารณูปโภคสูงที่สุด รองลงมาคือหมวดขนส่งและโลจิสติกส์ และอันดับสามหมวดวิศวกรรมและเครื่องจักร อย่างไรก็ตามปัจจุบันผลกระทบต่อกำไรยังไม่มีนัยยะเนื่องจากประเทศไทยยังไม่ข้อกำหนดบังคับเข้มงวดจริงจังและเป็นภาคสมัครใจ แต่เมื่อไรก็ตามที่กฎระเบียบมีผลบังคับใช้ จะส่งผลกระทบต่อไรลดลงสำหรับบริษัทที่ปล่อยก๊าซเรือนกระจกออกมาในปริมาณมาก

Carbon credit – สถานการณ์และผลกระทบต่อกำไร

Event

ข้อมูลเชิงลึกของคาร์บอนเครดิต และผลกระทบต่อกำไรบริษัทจดทะเบียนฯ

Impact

ต้นกำเนิดของคาร์บอนเครดิต (Carbon credit)

ปัจจุบันกระแสการทำธุรกิจอย่างยั่งยืน (ESG) ได้รับความสนใจมากขึ้นเรื่อย ๆ รวมไปถึงการให้ความสำคัญกับการเปลี่ยนแปลงสภาพภูมิอากาศ โดยที่ Carbon credit ถือเป็นเครื่องมือที่คาดว่าจะช่วยเพิ่มปริมาณการปล่อยก๊าซเรือนกระจกน้อยลง ในขณะที่ ขนาดตลาดคาร์บอนเครดิตโลก ประเมินว่าจะมีอัตราเพิ่มขึ้น CAGR ที่ 21.1% ในปี 2566-71 จากความต้องการของบริษัทต่างๆ ในการเข้าสู่ความเป็นกลางทางคาร์บอน (Carbon neutrality) มีมากขึ้น ทั้งนี้งานวิจัยหลายแห่งประเมินว่าอุปทานคาร์บอนเครดิตทั่วโลก ยังไม่สามารถตามทันกับอุปสงค์ที่เพิ่มขึ้นรวดเร็ว

พัฒนาการของคาร์บอนเครดิตในโลกและประเทศไทย

ในประเทศพัฒนาแล้ว (EU, จีน, และ US) มีมาตรการควบคุมการปล่อยมลพิษที่ชัดเจนและเคร่งครัดแบบภาคบังคับ ขณะที่อีกนานาประเทศกำลังพิจารณาแผนดังกล่าวเช่นกัน แต่ที่ประเทศไทยถือว่ายังอยู่ในช่วงเริ่มต้นและเป็นแบบภาคสมัครใจเท่านั้น โดยมีมาตรฐาน Carbon credit อย่าง T-VER ดังนั้นทั้งปริมาณและราคา Carbon credit ในไทยจึงยังถูกกว่าประเทศพัฒนาแล้วอย่างมากเช่น ระบบซื้อขายสิทธิ์ปล่อยก๊าซเรือนกระจกในยุโรป (EU ETS) ปัจจุบันราคา Carbon credit ในไทยเฉลี่ยอยู่ที่ Bt40/tCO₂e เทียบกับ €105/tCO₂e ในยุโรป อย่างไรก็ตามคาดการณ์กันว่าในไทยมีอุปสงค์คาร์บอนเครดิตที่ ~182-197MtCO₂e ต่อปี ขณะที่อุปทานมี 6.857MtCO₂e ต่อปี โดยในเรื่องนี้หากมีการเก็บภาษีคาร์บอน ผู้ที่ก่อมลพิษจะมีต้นทุนดำเนินงานสูงขึ้น แต่มีผู้ได้รับประโยชน์จากการที่มี credits ส่วนเกินอยู่

ผลกระทบต่อกำไรกลุ่มบริษัทจดทะเบียนฯ ในไทยจะเป็นอย่างไร...?

เราประเมินผลกระทบเชิงลบต่อกำไรบริษัทจดทะเบียนในไทย ภายใต้สมมติฐานที่หากกรมสรรพสามิตบังคับใช้ภาษีปล่อยคาร์บอน (คาดว่าจะชัดเจนในหลักการปี 2566) และ/หรือบริษัทสมัครใจที่จะชดเชยการปล่อยคาร์บอนเอง โดยเราศึกษาการปล่อยกระจายก๊าซเรือนกระจกในแต่ละหมวดอุตสาหกรรมสัดส่วนของ GDP และแบ่งสมมติฐานราคาคาร์บอนเป็น 3 scenarios เพื่อคำนวณผลกระทบต่อกำไรในแต่ละหมวด (รายละเอียดตารางหน้า 6) โดยสรุปแล้วเราพบว่า 3 หมวดอุตสาหกรรมที่ปล่อย GHG ออกมามากที่สุดคือ หมวดสาธารณูปโภค (65-103tCO₂e) ตามด้วยหมวดขนส่งและโลจิสติกส์ (27-34tCO₂e) และหมวดวิศวกรรม (17-18tCO₂e) แต่ผลกระทบต่อกำไรของแต่ละกลุ่มฯ จะแตกต่างกันไป ทั้งนี้จากการวิเคราะห์ว่า ผลกระทบของ Carbon credits ที่มีต่อกำไรบริษัทฯ คาดจะส่งผลกระทบต่อหมวดสาธารณูปโภคสูงที่สุด รองลงมาคือหมวดขนส่งและโลจิสติกส์ และอันดับสามหมวดวิศวกรรมและเครื่องจักร

Valuation and action

เราคำนวณต้นทุนกลุ่มโรงไฟฟ้า Neutral ผลกระทบของ Carbon credit ยังถือว่าไม่มีนัยสำคัญต่อกำไรบริษัทจดทะเบียนไทยในปัจจุบันจากการควบคุมที่เป็นเพียงภาคสมัครใจเท่านั้น แต่เมื่อใดก็ตามที่กฎข้อบังคับจริงจังและเข้มงวดขึ้นต่อผู้ที่ปล่อยมลพิษ อาจส่งผลกระทบต่อความสามารถในการทำไรจะลดลงจากการที่ต้องลดมลพิษในกระบวนการผลิตหรือซื้อ Carbon credit เพื่อชดเชย ทั้งนี้ดูเหมือนว่าปัจจุบันบริษัทไทยจะยังไม่พร้อมสำหรับการใช้ข้อบังคับที่จริงจังต่อการปล่อยคาร์บอน โดยน่าจะต้องใช้เวลาหนึ่งสำหรับการปรับตัวเพื่อลดการปล่อยมลพิษในการผลิต นอกเหนือไปจากการดำเนินธุรกิจแบบปกติ

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Peer comparison

Stocks	Rating	TP Bt	Mkt.price Bt	Upside (%)	Mkt.cap (Bt bn)	Implie d PE-	EPS (Bt)			EPS growth (%)			PE (x)			BPS			PBV (x)			Div. yield			ROE (%)		
							22	23F	24F	22	23F	24F	22	23F	24F	22	23F	24F	22	23F	24F	22	23F	24F	22	23F	24F
BGRIM*	OP	46.00	40.00	15.0	104	62.1	-0.5	0.7	1.2	-155	-255	60	-84	54	34	16.2	17.7	20.0	2.5	2.3	2.0	0.8	3.6	-3.0	4.2	5.9	
GPSC*	OP	80.00	68.00	17.6	192	43.3	0.3	1.8	2.1	-88	484	16	215	37	32	40.8	42.1	43.8	1.7	1.6	1.6	1.2	1.3	0.8	4.4	4.9	
GULF*	OP	62.00	54.25	14.3	637	38.8	1.0	1.6	2.0	49	64	25	56	34	27	11.6	12.3	13.3	4.7	4.4	4.1	1.8	2.2	8.4	13.0	15.0	
RATCH*	N	41.00	38.75	5.8	56	11.7	2.7	3.5	4.3	-51	32	22	15	11	9	49.4	51.3	53.9	0.8	0.8	0.7	4.1	4.3	5.4	6.8	7.9	
EGCO*	N	166.00	159.00	4.4	84	10.2	5.1	16.2	17.5	-35	218	8	31	10	9	229.4	238.8	249.6	0.7	0.7	0.6	4.4	4.4	2.2	6.8	7.0	
BCPG*	N	10.40	10.20	2.0	30	18.7	0.9	0.6	0.5	22	-39	-2	11	18	19	10.1	10.2	10.4	1.0	1.0	1.0	3.6	3.7	9.0	5.4	5.2	
BPP*	N	17.00	14.90	14.1	45	14.2	1.9	1.2	1.2	84	-35	3	8	12	12	17.1	17.6	18.1	0.9	0.8	0.8	4.4	4.4	10.9	6.8	6.8	
CKP*	OP	5.60	4.10	36.6	33	19.7	0.3	0.3	0.3	12	-5	1	14	14	14	4.7	4.9	5.1	0.9	0.8	0.8	2.4	2.7	6.4	5.8	5.6	
Sector : Neutral							-20.2	58.1	16.5	33.2	23.8	19.5				1.6	1.5	1.4	2.8	3.3	5.0	6.7	7.3				

Source: KGI Securities Research

The origin of Carbon Credit

To reduce global greenhouse gases (GHG), the United Nations (UN) enacted the Kyoto Protocol (1997-2012) and Paris Agreement (2015-present). More than 190 nations have signed on to reduce their GHG and limit the global temperature rise to <2°C above preindustrial levels in 2010. China is world’s biggest polluter, representing around 30% of global emissions, followed by the US, India, Russia, and Japan. Most of the temporary solutions involve the use of carbon markets for convenience and accessible costs.

Carbon credits were designed as a mechanism to reduce GHG emissions by creating a market where firms can trade credits to help reduce their carbon footprints. Buyers are those interested in reducing their carbon footprints, while sellers have excess credits to offer. Entrepreneurs have to pay additional costs to compensate for emitting pollution.

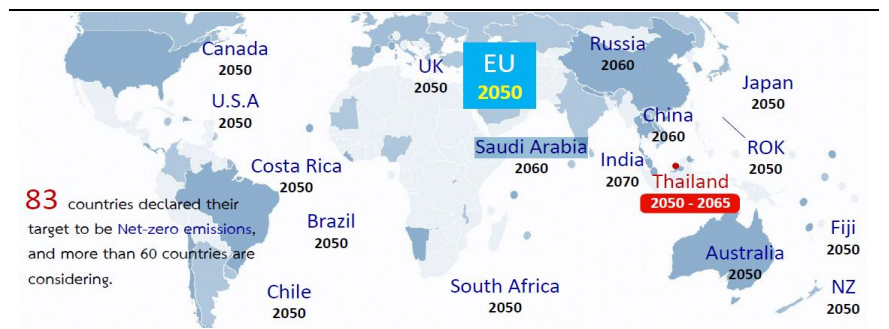
According to the Carbon Offset Guide, there are two types of carbon markets: Mandatory schemes and voluntary programs. The former is created and regulated by national, regional, or international carbon reduction regimes, such as the Emission Trading System (ETS) in the EU. The latter, operates outside the compliance markets but in parallel, allowing private companies and individuals to purchase carbon credits on a voluntary basis. Transactions can take place via trading platforms or over the counter.

The global carbon credit market is seen as a cost-effective tool for emission reduction. Currently, around 47 nations are pricing emissions through carbon taxes or ETS, while another 65 countries are considering such schemes (IMF, 2022). Initiatives (led by ETSs and carbon taxes) cover 23.17% of global GHG emissions, with prices rising as high as US\$105 per ton in the EU (Figure 2). The value of traded global markets for carbon credits hit a record US\$909bn in 2022, due to a 14% rise in price, moderated by a 20% decline in volumes from economic turbulence (Refinitiv, 2023). The global carbon credit market is forecast to rise at a CAGR of 21.1% in 2023F-28F as the number of firms making neutrality commitments rises. The biggest markets are led by the EU, China, Australia, and Canada. Common projects, which provide credits, consist of reforestation, renewable energy, waste-and-landfill management, and technology-based removal of carbon from the atmosphere like carbon capture.

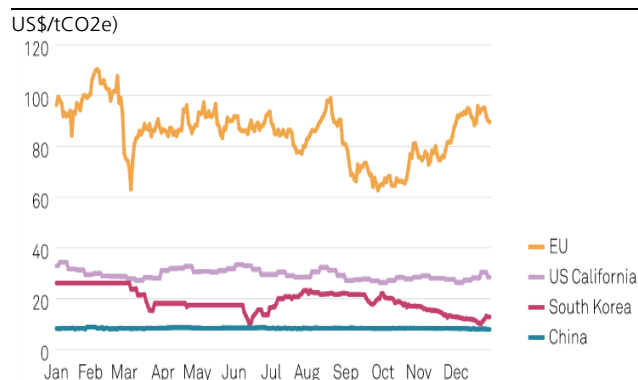
With the rising popularity of Environmental Social Governance (ESG) and concerns about climate change, carbon credits are seen as a tool that can be used to achieve carbon neutrality and net zero carbon. The global carbon credit market is forecast to rise at a CAGR of 21.1% in 2023-28 on rising demand from higher carbon neutrality commitments. Several research houses have said that global supply of carbon credits would not catch up with the rising demand.

Carbon credits have several prices based on project types, standards, and markets where they are traded (Figures 3-5). In 2019, the average price for carbon credits was US\$4.33 per ton. This figure spiked to as much as US\$5.60 per ton in 2020 before settling to an average of US\$4.73 in the first eight months of 2021.

Figure 1: Targets for net zero emissions around the world



Source: Climate Watch Data, KGI Securities Research

Figure 2: Cross-comparison of global compliance market prices


Source: S&P Global Commodity Insights, KGI Securities Research

Figure 3: By project type: Transacted voluntary carbon offset volumes and prices and values (2019 - 2021)

	2020			2021		
	VOLUME (MtCO2e)	PRICE (USD)	VALUE (USD)	VOLUME (MtCO2e)	PRICE (USD)	VALUE (USD)
FORESTRY AND LAND USE	57.8M	\$5.40	\$315.4M	227.7M	\$5.80	\$1,327.5M
RENEWABLE ENERGY	93.8M	\$1.08	\$101.5M	211.4M	\$2.26	\$479.1M
CHEMICAL PROCESSES / INDUSTRIAL MANUFACTURING	1.8M	\$2.15	\$3.9M	17.3M	\$3.12	\$53.9M
WASTE DISPOSAL	8.5M	\$2.69	\$22.8M	11.4M	\$3.62	\$41.2M
ENERGY EFFICIENCY / FUEL SWITCHING	30.9M	\$0.98	\$30.4M	10.9M	\$1.99	\$21.9M
HOUSEHOLD / COMMUNITY DEVICES	8.3M	\$4.34	\$36.2M	8.0M	\$5.36	\$43.3M
TRANSPORTATION	1.1M	\$0.64	\$0.7M	5.4M	\$1.16	\$6.3M
AGRICULTURE	0.5M	\$10.38	\$4.7M	1.0M	\$8.81	\$8.7M

Source: Forest Trends Initiatives, KGI Securities Research

Figure 4: By region: Transacted voluntary carbon offset volumes & price (2019 - Aug 2021)

	2019		2020		2021 (through August)	
	Volume (MtCO2e)	Price (USD)	Volume (MtCO2e)	Price (USD)	Volume (MtCO2e)	Price (USD)
Africa	16.1	\$3.94	14.9	\$4.24	23.9	\$5.52★
Asia	45.6	\$1.80	63.0	\$1.60	91.8★	\$3.34
Europe	1.1	\$2.92	1.7	\$9.47	0.8	\$2.96
Latin America & Caribbean	15.3	\$3.45	18.9	\$4.17	36.6	\$3.74
North America	15.5	\$3.51	11.6	\$6.31	10.0	\$5.13
Oceania	0.5	\$12.53	0.1	\$20.57	0.1	\$32.93

Source: Forest Trends Initiatives, KGI Securities Research

Figure 5: By standard: Transacted voluntary carbon offset volumes & price (2019 - Aug 2021)

	2019		2020		2021 (through August)	
	Volume (MtCO2e)	Price (USD)	Volume (MtCO2e)	Price (USD)	Volume (MtCO2e)	Price (USD)
American Carbon Registry (ACR)	2.5	\$5.36	5.4	\$8.44	2.0	\$11.37
Clean Development Mechanism (CDM)	4.9	\$2.02	7.0	\$2.19	8.2	\$1.13
Climate Action Reserve (CAR)	4.0	\$2.34	2.1	\$4.44	4.9	\$2.12
Gold Standard	13.2	\$5.27	13.9	\$4.57	5.2	\$3.94
Plan Vivo	0.9	\$8.99	1.2	\$8.49	0.7	\$11.58
Verified Carbon Standard (VCS)	44	\$1.74	66.1	\$3.76	125.6★	\$4.17

Source: Forest Trends Initiatives, KGI Securities Research

Status of carbon credit in Thailand

This is a new issue for Thailand, and the country is only in the early stages, and a far cry from the EU, US, and China. The nation is ranked 21st globally for emissions, producing 0.8% of the world's GHG emissions. Thailand's long-term strategy is to reduce GHG by 40% by 2030 before reaching a state of carbon neutrality by 2050 and net zero GHG emissions by 2065. The country's industrial emission of CO₂ per unit of energy consumption is below China and at the average for Asia, but higher than the global average, the US, and the EU. Also, trading volumes of carbon credit in Thailand remains trivial against annual carbon emissions by several companies. We think this is because of three factors: i) elevated cost of measures and reporting for certified carbon credit; ii) Thailand has not yet adopted a mandatory emission reduction program, resulting in cautiousness by many companies; and iii) Thailand has no high-quality carbon credit such as afforestation and carbon capture, and something like storage technology. As such high-quality sources require expensive investment, and Thailand is far from enjoying high prices for carbon credits like the EU.

At present, those who would like to participate in carbon credit trading in Thailand have two popular options:

- i) International Renewable Energy Certificates (I-RECs) (one-year lifetime). Investors must enroll on Netherland's I-REC website and ask EGAT for help in reviewing related documents. The certified carbon units from I-RECs can be traded internationally (1 I-REC = 1 MWh) with global standards and better pricing than Thailand. However, the certified credits can only be stored for one year before expiring. The project, which fits the REC criteria, is only for RE projects such as solar, wind, hydropower, etc. Following Thailand's law, most I-RECs from existing renewable projects are claimed by the government, not power producers. Hence, potential I-REC are likely to derive from some existing projects and new RE projects at home and overseas. I-REC is expected to help Thailand reduce GHG emissions by

20-25% in 2030F. I-REC can be traded as bundled REC (green electricity + REC) and unbundled REC (only REC). Thailand only has the latter.

- ii) Thailand Voluntary Emission Reduction Program (T-VER) (no expiration). The certified credits can be traded only in Thailand due to the domestic standard (1 Unit = 1 tCO₂e). Credits can be found through forestation, renewable energy, usage of electric vehicle, etc. The trading prices are quite a bit lower than global markets. Those who register for I-RECs cannot simultaneously enroll for T-VER due to double counting. Thailand's authority is developing T-VER to meet international standards and such a move may awaken demand for credits from those who care about ESG.

For other international standards, the price of credits is higher than the two mentioned above, aligning with higher registration expenses and difficulty in developing projects.

Based on our observation, there are 141 projects certified by T-VER with 13.97mn tCO₂e so far (led by volumes from renewable energy projects, energy efficiency, waste management, and forestation). Thailand's average carbon credit price has fallen to Bt36.8/tCO₂e based on YTD data, down from Bt108/tCO₂e in 2022, but still higher than Bt34/tCO₂e in 2021 and Bt26/tCO₂e in 2020. The accumulated carbon credit transaction value has risen to Bt153mn and 2.018mn tCO₂e – a trivial increase from 2022's data of Bt150mn and 1.93mn tCO₂e in 2016-22 (Figure 6). Mr. Varawut Silpaarcha, the minister of Natural Resources and Environment of Thailand, forecasts the market value of carbon credit to be Bt325bn in 2065F.

Thailand's carbon credit price is still lower than other countries, particularly in the EU which has the largest market for credits. The global prices and the EU price are ~US\$40-60/tCO₂e and ~Bt3,500/tCO₂e, while South Korea's price is around six times higher than Thailand. It may vary among nations that operate their own carbon credit markets and depend on the standards they stick to such as T-VER, REC, Gold Standard (GS), Verra's Verified Carbon Standard (VCS), Climate Action Reserve (CAR), and American Carbon Registry (ACR) (Figures 8-9). In a nutshell, there are no in-depth details on the standards or clear tools toward net-zero carbon for nations.

In terms of demand and supply projections from 4-5 international schemes, Thailand is in the state of supply shortage. Demand for carbon credits in Thailand is expected to be ~182-197MtCO₂e p.a. and total ~1,640-1,775MtCO₂e in 2030F. Meanwhile, supply of carbon credits is forecast at 6.857MtCO₂e p.a. and total 65.32MtCO₂e in 2030F (Figure 10).

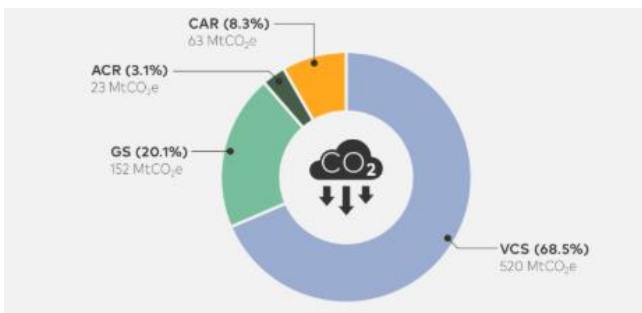
In late 2022, FTIX (Thailand's first carbon credit exchange platform) debuted and was ready for transactions since January 16, 2023. The platform supports firms and government agencies to buy and sell carbon credits, rather than over the counter (OTC), and track emissions through an online database. Around 12,000 private firms have joined the platform.

All in, we are upbeat about the long-term growth opportunities from the sale of carbon credits, as Thailand is in the early stage versus leaders like the EU. There should be broad-based beneficiaries, largely RE players (BCPG (BCPG.BK/BCPG TB)*, B. Grimm Power (BGRIM.BK/BGRIM TB)*, Energy Absolute (EA.BK/EA TB), Absolute Clean Energy (ACE.BK/ACE TB)*, Global Power Synergy (GPSC.BK/GPSC TB)*, and Thachang Green Energy (TGE.BK/TGE TB)) (Figure 7) and those interested in joining the value chain such as Wave Entertainment (WAVE.BK/WAVE TB) (advisory), Super Energy Corporation (SUPER.BK/SUPER TB) (trading platform), and Ditto (Thailand) (DITTO.BK/DITTO TB) (forestation). At this point in time, selling all carbon credits in hand (Figure 7) may create trivial upside for the companies (<5% of the Street's earnings forecasts in 2023F-24F).

Figure 6: Trading volumes and value of carbon credits under T-VER program

Year	Trading volumes (tCO ₂ e)	Transaction value (Bt)	Avg. price per tCO ₂ e
2016	5,641	846,000	149.97
2017	33,468	1,006,000	30.06
2018	144,697	3,090,520	21.37
2019	131,028	3,246,980	24.78
2020	169,806	4,375,690	25.77
2021	286,580	9,714,190	33.90
2022	1,187,327	128,489,980	108.22
2023 YTD	60,880	2,239,250	36.78

Source: T-VER, KGI Securities Research

Figure 8: Share of credits issued in the VCM, a decentralized market for voluntarily carbon trading in 2020


Source: VCMPRIMER, KGI Securities Research

Figure 7: Sample groups of companies involved in carbon credits

Company	Type of projects	Certified credits under T-VER (tCO ₂ e)
TGE	Renewable energy	33,964
EA	Renewable energy	2,082,063
SSP	Renewable energy	33,786
TPIPP	Waste management	799,987
BCPG	Renewable energy	734,423

Source: Company data, KGI Securities Research

Figure 9: Four main international carbon standards

Standard	Market Volume (M + million)	Name of credits (Representing 1 tCO ₂ e)	Geographical Scope	Sectoral Scope
Verified Carbon Standard (VCS)	746 M credits, 70.44% share	Verified Carbon Units (VCUs)	1,792 registered projects in 82 countries. VCS is dominant in developing countries.	Covers all project classes.
Gold Standard (GS)	184 M credits, 17.37% share	Verified Emission Reductions (VERs)	1,313 registered projects in 80 countries. Credits are purchased especially by buyers in the European Union.	Covers most project classes, but excludes project-level REDD+. After 2025, will only cover credits backed by corresponding adjustments.
American Carbon Registry (ACR)	63 M credits, 5.95% share	Emission Reduction Tons (ERTs)	156 projects in the United States.	Covers industrial processes, land use, land use change and forestry, carbon capture, waste.
Climate Action Reserve (CAR)	66 M credits, 6.23% share	Climate Reserve Tonnes (CRTs)	26 projects in the US. CAR serves as the Offset Project Registry for California's Cap-and-Trade Program. CAR is also running a pilot Emissions Trading System in Mexico from 2020-2023.	Covers agriculture and forestry, energy, waste, and non-CO ₂ GHG abatement.

Source: VCMPRIMER, KGI Securities Research

Figure 10: Projections of demand and supply for carbon credits in Thailand

Demand of Carbon Credits			Supply of Carbon Credits		
Scheme	Quantity (MtCO ₂ e/year)	Total Quantity (MtCO ₂ e @ 2030)	Scheme	Quantity (MtCO ₂ e/year)	Total Quantity (MtCO ₂ e @ 2030)
1. CORSIA	25 - 40	250 - 400	1. T-VER	4.95	52.69
2. Organization Offset - SBT	156.23	1,563	2. CDM	0.3	1.7
3. Event Offset	0.95	9.5	3. JCM	0.14	0.74
4. Tourism Offset	0.00103	0.0103	4. VERRA	1.39	9.50
5. Personal Offset	0.054	0.54	5. Gold Standard	0.077	0.69
Total Demand per year ~ 182.23 – 197.23 MtCO ₂ e			Total Supply per year 6.857 MtCO ₂ e		
Total Demand until 2030 ~ 1,640 – 1,775 MtCO ₂ e			Total Supply until 2030 65.32 MtCO ₂ e		

Source: Thailand Greenhouse Gas Management Organization (TGO), KGI Securities Research

How to estimate the impact to profits of Thai companies...?

Source of curiosity. As Thailand is riding the wave of carbon credit awakening, we try to estimate the impact to profits of Thai companies if the excise department implements a carbon tax by compliance (to be evident in 2023) and/or companies intend to voluntarily offset their carbon footprints with credits or to match with non-tariff measures overseas such as Cross Border Adjustment Mechanism (CBAM) (in effect in 2026) in the EU. Hence, knowing how carbon credit prices per ton affect the net profits of companies could help investors learn the degree of negatives and which sectors would be impacted the most.

Procedure: We carefully classify each of the sectors in the SET to match with five main sectors stated in Thailand's GHG emissions based on their business types:

- i) Energy sector: Oil & gas, and utilities.
- ii) Industrial sector: Mining & quarrying, metal production, chemical industry.
- iii) Manufacturing industries & construction: Agribusiness, automotive, industrial materials & machinery, paper & printing materials, packaging, electronic components, construction materials, property development, property fund, construction services.
- iv) Other sectors: Food & beverages, commerce, health care services, media & publishing, tourism & leisure, and ICT;
- v) Transportation & logistics

Then, based on the data on national GHG emissions (Figure 11), we distribute shares of emissions adjusted by proportion (revenue divided by GDP in those sectors) into one of the five main sectors.

After that, to reflect a hope that free emissions will be increasingly tightened over time, increasing the price, we apply three carbon price scenarios:

- (i) Worst case is Bt40/tCO₂e – 2023's YTD price.
- (ii) Base case is Bt110/tCO₂e – 2022's highest price.
- (iii) Blue-sky case is Bt2,100/tCO₂e – average of the EU ETS price of US\$40-80/tCO₂e with Bt35 = US\$1. We think this case is unlikely for Thailand due to the nation's voluntary scheme.

Our assumptions consist of

- 2019 data: Thai GDP / revenues and net profits of Thai listed companies / total GHG emissions by sector.
- Revenues and net profits of Thailand's listed companies in 2022.
- Carbon prices in Thailand via T-VER and the EU ETS

Our main findings. It seems like the top three sectors that emit the most GHG are utilities (65-103tCO₂e), transportation & logistics (27-34tCO₂e), and construction materials (17-18tCO₂e) in 2019 and 2022, but the impact to the profits of these sectors is not the same ranking. We learned that carbon credits negatively impacted the utilities sector the most, followed by transportation & logistics, industrial materials & machinery, construction & construction materials, petrochemicals & chemicals, steel & metal, and electronic components. Meanwhile, although some sectors like energy and property development emit high pollution, the impact to their profits is low due to the high profit bases, leading to insignificant negative costs. Our results are shown in Figures 12-13.

Weakness of our methodology includes i) volatility of the performances of the companies each year from several uncontrollable factors such as COVID-19, one-time items, unrealized gains/losses, resulting in different impacts to net profits in 2019 and 2022; ii) double counting in the revenues of some sectors, resulting in revenue amounts being larger than GDP in those sectors, such as BCP (Energy) and BCPG (Utilities); and iii) we have no exact data on carbon emissions from each of the listed companies as it is too detailed.

Here are key sectors affected by carbon credits and emit high emissions:

- Utilities.** Electricity production creates the most emissions among the sectors, and carbon has the largest impact to the sector's profit. The sector is dominated by gas-fired power plants, while there are renewable (RE) projects in the mix, which produce near-zero emissions. Almost all power producers fit into the mentioned criteria such as Gulf Energy Development (GULF.BK/GULF TB)*, BGRIM, GPSC, Electricity Generating (EGCO.BK/EGCO TB)*, Ratch Group (RATCH.BK/RATCH TB)*, etc. We could not assume that all companies in the sector produce GHG emissions as the impact of carbon has no harm to those who are pure-renewable players (e.g., SSP, TGE, ACE, PRIME), but do partially impact those who have a mix of RE in their portfolios. Besides, there are other businesses like industrial water procurement and waste management that would have no significant pollution to the sector. Lastly, as all companies in the sector know the threat from the ESG stream, the move towards net-zero carbon is embedded in their long-term visions.
- Transportation & logistics** is the second largest emitting sector, and it also the sector that is expected to have the second largest impact, behind utilities. Burning fossil fuels and using electricity in transportation and logistics produce high levels of emissions as long as the population grows, especially post-COVID-19 as people return to normal life. More than 90% of fuels used for transportation are petroleum based, which includes primarily gasoline and diesel. Some studies suggest that if road transportation switches entirely to electric energy sources, emissions might fall significantly. Companies who directly emit pollutions are led by trains (BTS Group Holdings (BTS.BK/BTS TB)*, Bangkok Expressway and Metro (BEM.BK/BEM TB)*), planes (Bangkok Airways (BA.BK/BA TB), Asia Aviation (AAV.BK/AAV TB)*, Thai Airways International (THAI.BK/THAI TB), ships (Precious Shipping (PSL.BK/PSL TB), Regional Container Lines (RCL.BK/RCL TB), Prima Marine (PRM.BK/PRM TB), Thoresen Thai Agencies (TTA.BK/TTA TB), cars & trucks (SCGJWD Logistics (SJWD.BK/SJWD TB)*, Mena Transport (MENA.BK/MENA TB), Triple I Logistics (III.BK/III TB), Kerry Express (Thailand) (KEX.BK/KEX TB))*). Meanwhile, some indirectly take part in the emissions as infrastructure providers like airports (Airports of Thailand (AOT.BK/AOT TB)*), port (Sahathai Terminal (PORT.BK/PORT TB)), terminal services (Namyong Terminals (NYT.BK/NYT TB)), tollway & motorway (Don Muang Terminal (DMT.BK/DMT TB), Thailand Future Fund (TFFIF.BK/TFFIF TB)).
- Industrial materials & machinery.** The sector would feel the third highest impact to profit due to low bases in profits and margins, despite not having much of a carbon footprint. This sprawling industry produces a huge range of products, many of which support other industries – wire & cable production (Stark Corporation (STARK.BK/STARK TB), Charoong Thai Wire and Cable (CTW.BK/CTW TB)), electrical equipment in power systems, machinery production for various usage in many other manufacturing processes (such as ALLA (ALLA.BK/ALLA TB), Chu Kai (CRANE.BK/CRANE TB), Kulthorn Kirby (KKC.BK/KKC TB), Fine Metal Technologies (FMT.BK/FMT TB), SNC Former (SNC.BK/SNC TB)). Most of the sector's direct emissions are derived from burning fossil fuels such as fuel oil, diesel, and coal to power chemical transformations. That said, some companies in the sector are likely to move away from dirty energy in their production by improving efficiency and installing solar rooftop panels or using electricity from renewable projects from third parties.
- Petrochemicals & Chemicals** profits would be impacted a moderate degree, despite having somewhat medium carbon footprints. This is due to their large profits. The sector is essential for many other value chains such as plastics, auto parts, crop yields, pharmaceuticals, and electronic components. The production processes can pollute in several ways to human health and environment like air, waste, soil, water, and climate change. Given net-zero carbon flow, many companies, especially the large ones (PTT Global Chemical (PTTGC.BK/PTTGC TB)*, Indorama Ventures (IVL.BK/IVL TB)*) are moving toward solutions, namely greener production to reduce waste and minimize hazardous materials, life cycle assessment.

- Construction & construction materials.** Most of the emissions come from production of construction materials, rather than the construction process. In production, there are processes that need heating, lighting, and cooling, as well as electrical appliances. Many companies have been adopting alternative fuels into their production processes and/or increasing production efficiency to reduce emissions as much as they can and to favor ESG investors. Sample companies are cement (Siam City Cement (SCCC.BK/SCCC TB), Siam Cement (SCC.BK/SCC TB)*, TPI Polene (TPIPL.BK/TPIPL TB), tile & roof (Dynasty Ceramic (DCC.BK/DCC TB), Diamond Building Products (DRT.BK/DRT TB), SCG Ceramics (COTTO.BK/COTTO TB)), color (TOA Paint (Thailand) (TOA.BK/TOA TB)), synthetic wood (S. Kijchai Enterprise (SKN.BK/SKN TB)), and asphalt (Tipco Asphalt (TASCO.BK/TASCO TB)).

Figure 11: GHG emissions by sectors in 2019 (the last updated data) – We use sector data from red boxes as attached

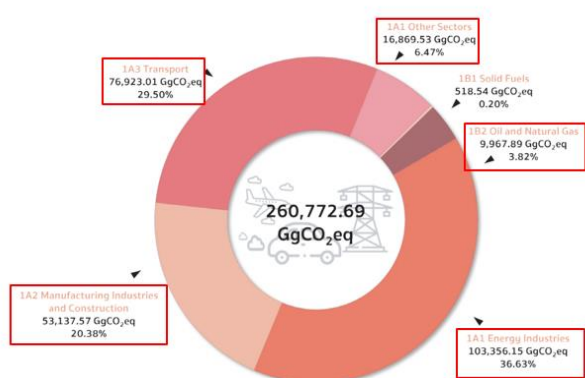


Figure 2-4: GHG emissions in Energy sector, 2019

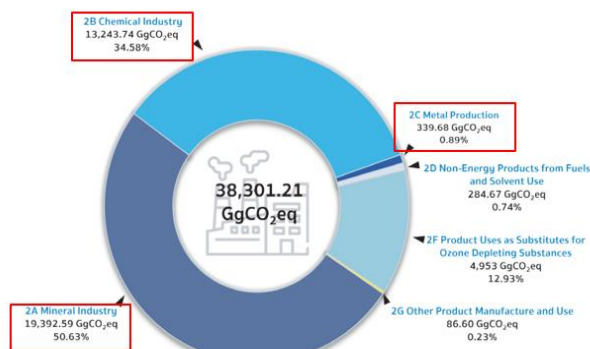


Figure 2-5: GHG emissions in Industrial Process and Product Use Sector, 2019

Source: Natural Resources and Environmental Policy and Planning (ONEP), KGI Securities Research

Figure 12: Our study: Impact of carbon credit to companies' net profits in 2019

Group	Sector	2019		Impact to 2019's net profit (Btmn)					
		Net profit (Btmn)	GHG emissions (tCO ₂ e)	Carbon prices (Bt/tCO ₂ e)			Percentage		
				Case I (40)	Case II (110)	Case III (2,100)	Case I (%)	Case II (%)	Case III (%)
3	Agribusiness	251	0.3	11	31	587	4.5	12.2	233.7
4	Food & Beverage	55,157	5.8	233	640	12,214	0.4	1.2	22.1
1	Energy (oil & gas)	155,059	10.0	399	1,096	20,933	0.3	0.7	13.5
3	Automotive	4,162	2.2	88	241	4,604	2.1	5.8	110.6
3	Industrial Materials & Machinery	(87)	1.4	56	154	2,940	(64.1)	(176.4)	(3,367.3)
3	Paper & Printing Materials	863	0.1	4	11	202	0.4	1.2	23.3
2	Petrochemicals & Chemicals	21,027	13.2	530	1,457	27,810	2.5	6.9	132.3
3	Packaging	4,757	2.1	85	233	4,443	1.8	4.9	93.4
2	Steel and Metal Products	408	0.3	14	37	713	3.3	9.1	174.7
3	Electronic Components	6,087	6.1	245	675	12,886	4.0	11.1	211.7
3	Construction Materials	43,692	18.2	728	2,001	38,206	1.7	4.6	87.4
3	Property Development	73,875	12.8	513	1,412	26,953	0.7	1.9	36.5
3	Property Fund & REITs	19,525	0.9	37	102	1,938	0.2	0.5	9.9
3	Construction Services	7,233	3.0	122	335	6,389	1.7	4.6	88.3
1	Utilities	56,865	65.2	2,606	7,167	136,834	4.6	12.6	240.6
2	Mining	76	0.0	0	0	3	1.2	3.2	61.0
4	Commerce	53,692	2.8	230	631	12,055	0.2	0.6	10.9
4	Health Care Services	27,995	0.4	20	55	1,054	0.1	0.2	3.4
4	Media & Publishing	3,309	0.2	5	13	257	0.2	0.7	12.7
4	Tourism & Leisure	2,622	0.3	8	22	411	0.4	1.2	23.0
5	Transportation & Logistics	32,222	34.3	1,065	2,929	55,912	4.3	11.7	223.8
4	Information & Communication Technology	92,053	3.1	94	258	4,930	0.1	0.4	7.2
Summary		660,844	183	7,091	19,500	372,273	1.1	3.0	56.3

Source: KGI Securities Research

Figure 13: Our study: Impact of carbon credit to companies' net profits in 2022

Group	Sector	2022		Impact to 2022's net profit (Btmn)					
		Net profit (Btmn)	GHG emissions (tCO ₂ e)	Carbon prices (Bt/tCO ₂ e)			Percentage		
				Case I 40	Case II 110	Case III 2,100	Case I %	Case II %	Case III %
3	Agribusiness	11,172	0.8	31	85	1,621	0.3	0.8	14.5
4	Food & Beverage	67,482	5.5	220	604	11,538	0.3	0.9	17.1
1	Energy (oil & gas)	283,972	10.0	399	1,096	20,933	0.1	0.4	7.4
3	Automotive	6,874	2.0	80	220	4,198	1.2	3.2	61.1
3	Industrial Materials & Machinery	3,488	1.8	71	195	3,716	2.0	5.6	106.5
3	Paper & Printing Materials	739	0.1	4	11	214	0.6	1.5	28.9
2	Petrochemicals & Chemicals	29,081	13.2	530	1,457	27,810	1.8	5.0	95.6
3	Packaging	12,932	5.0	201	553	10,558	1.6	4.3	81.6
2	Steel and Metal Products	(2,718)	0.3	14	37	713	(0.5)	(1.4)	(26.2)
3	Electronic Components	23,870	8.1	323	888	16,961	1.4	3.7	71.1
3	Construction Materials	39,661	16.6	663	1,824	34,829	1.7	4.6	87.8
3	Property Development	72,723	9.8	392	1,078	20,572	0.5	1.5	28.3
3	Property Fund & REITs	18,401	0.7	28	77	1,462	0.2	0.4	7.9
3	Construction Services	(2,767)	2.4	95	262	5,004	(3.4)	(9.5)	(180.8)
1	Utilities	49,053	103.4	4,135	11,370	217,067	8.4	23.2	442.5
2	Mining	(166)	0.0	0	0	3	(0.0)	(0.1)	(1.7)
4	Commerce	59,120	5.7	230	631	12,055	0.4	1.1	20.4
4	Health Care Services	34,818	0.5	20	55	1,054	0.1	0.2	3.0
4	Media & Publishing	5,446	0.1	5	13	257	0.1	0.2	4.7
4	Tourism & Leisure	(1,822)	0.2	8	22	411	(0.4)	(1.2)	(22.5)
5	Transportation & Logistics	17,822	26.6	1,065	2,929	55,912	6.0	16.4	313.7
4	Information & Communication Technology	35,488	2.3	94	258	4,930	0.3	0.7	13.9
Summary		764,670	215	8,606	23,667	451,818	1.1	3.1	59.1

Source: KGI Securities Research

Eyes on regulations related to emissions in Asia and the EU

Looking around the globe, regulations on emissions and carbon credit schemes come in various forms, especially cap-and-trade programs, also known as emission trading systems (ETS), in Canada, the EU, the UK, China, New Zealand, Japan, and South Korea, with several more nations considering implementation. Carbon credits in cap-and-trade programs are to emit a certain set amount of CO₂e that year. Regulators set a limit on carbon emissions – the cap and that cap gradually falls over time, making it harder for firms to stay within the cap.

Overview of Asia

We gathered regulations related to carbon emission in some Asian countries led by Japan, China, South Korea, and Thailand (Figure 14). It seems like Japan is the first to introduce a carbon tax among Asian countries at JPY 2,89/ t-Co₂ (\$2.65) on October 1, 2012.

Case study: The share price movement of NYK Line, Japan's leading maritime transportation company, reflects a weak investor reaction to the introduction of the carbon tax. The carbon tax system allows companies to calculate how much they will need to pay to make financing plans more accurately so investors can predict future performance. Studies have suggested that investors seem to adopt exclusionary screening policies based on the scope of emission intensity and the carbon tax associated with it.

Share Price Change (all else being equal):

- 5 Day Impact: + 0.08%
- 7 Day Impact: - 0.12%

Figure 14: Development of regulations in well-known countries and Thailand

<u>Japan</u>	<u>China:</u>	<u>Korea:</u>	<u>Thailand:</u>
<p>Carbon Tax:</p> <ul style="list-style-type: none"> - One of the first countries to implement a carbon tax due to its geographic positioning in the Pacific making it highly susceptible to climate change. - Plans to cut greenhouse gas emissions to 26% by 2030, and reach net zero by 2050 (GlobalData, 2023). - The government has postponed an expansion of the carbon tax for the second time that was set to be introduced in 2023 due to rising inflation and a weakening yen (GlobalData, 2023). With a higher tax, cost of living will further increase. - Current tax rate of <u>US\$2.65/t-CO₂</u>. With its tax rate considered quite low, it is argued that Japan's carbon tax policy falls short. <p>ETS:</p> <ul style="list-style-type: none"> - The Ministry of the Environment and the Ministry of Economy, Trade and Industry (METI) have outlined plans to establish an ETS in the early 2030s. - It has a pilot emission trading scheme, and for a day, a total of 627 CO₂-tonnes were traded across the four categories under the J-Credit scheme, with the most heavily traded renewable energy credit settling at ¥3,300 (US\$23) per CO₂-tonne, according to the TSE. 	<p>Carbon Tax:</p> <ul style="list-style-type: none"> - China does not have a carbon tax. <p>ETS:</p> <ul style="list-style-type: none"> - Officially launched in 2021 at a national level, the ETS applies to CO₂ emissions from the power sector, including combined heat and power and captive power plants from other sectors. - In contrast to other schemes, such as those in the EU, China's system of assigning emissions allowances does not set a fixed limit in advance. Instead, it determines allowances based on the carbon emissions per unit of production. Each allowance permits a company to produce 1 ton of carbon emissions. 	<p>Carbon Tax:</p> <ul style="list-style-type: none"> - Currently, the price of carbon is relatively low, at 28,000 won (US\$21.57) per ton of CO₂ equivalent, which is only a quarter of the price in Europe. - During 2021 to 2025, only 10% of the carbon credits will be available through auction, with the remaining credits being distributed to companies without charge. <p>ETS:</p> <ul style="list-style-type: none"> - Korea ETS applies to all greenhouse gas emissions from the industrial, power, buildings, domestic aviation, public, and waste sectors. - Under Phase 3 of the ETS, which runs until 2025, the scheme will expand to include additional sectors such as transportation. 	<p>Carbon Tax:</p> <ul style="list-style-type: none"> - Thailand is considering implementing a carbon tax, but exact details on the tax, including its timeframe and scope, are currently under discussion among policymakers and experts. Thailand is ranked 9th in the world as the country most impacted by climate change by the UN. - The director general of the Excise Department, Ekniti Nitithanprapas, stated that four factors are driving Thailand towards a carbon tax: climate change, digital disruption, ageing society, and economic recovery amid rising energy prices. Other countries, including those in the EU, already have carbon taxes and if Thailand implements one, they will negotiate with these countries to exempt Thai products from their carbon taxes. <p>ETS:</p> <ul style="list-style-type: none"> - Thailand has taken a significant step towards its goal of carbon neutrality by 2050 and combating climate change with the launch of its first carbon credit exchange. FTIX, the new carbon market run by the Federation of Thai Industries, will compromise approximately 12,000 private companies across 45 industries.

Source: KGI Securities Research

Overview of the EU

We have found that many EU countries are tackling carbon emissions by launching measures, including ETS, instituting environmental regulations, and carbon taxes. Finland was the world's first nation to debut a carbon tax in 1990. Since then, the remaining 19 EU nations have followed by implementing carbon taxes that range from €1/tCO₂e in Poland - > €100/tCO₂e in Sweden, Switzerland, and Liechtenstein.

Except for Switzerland, the UK, and Ukraine, members of the EU are part of the EU ETS, a market made for trading a capped number of GHG allowances. Switzerland has its own ETS, which is tied to the EU ETS from January 2020, while the UK, after Brexit, implemented its own ETS in January 2021.

The European Commission has proposed a target of reducing carbon emissions from sectors covered by the EU ETS by 61% by 2030, compared to 2005 levels. This is an increase of 18% from the current target of a 43% reduction. To reach this target, the commission is proposing a steeper annual reduction rate of 4.2% and a one-time reduction of the overall emissions cap by 117mn allowances. The commission also plans to phase out free emissions allowances for the aviation sector and switch to full auctioning of allowances by 2027 to create a stronger price signal to encourage emissions reduction. It is forecasted that clean energy capacity in poorer countries will simply be shifted to the production of exported goods, and local consumption might be relying more on dirty fuels.

Case study: Angang Steel Company Limited and the EU Cross Border Adjustment Mechanism (CBAM) (full implementation in 2026). Angang Steel Company Ltd is one of the largest steel enterprises in China and iron exporter to the EU (Ansteel, 2023). On July 14, 2021, the EU announced CBAM, which introduces import tariffs on carbon-intensive sectors including iron and steel (European Commission, 2022).

Stock Price Change (all else being equal):

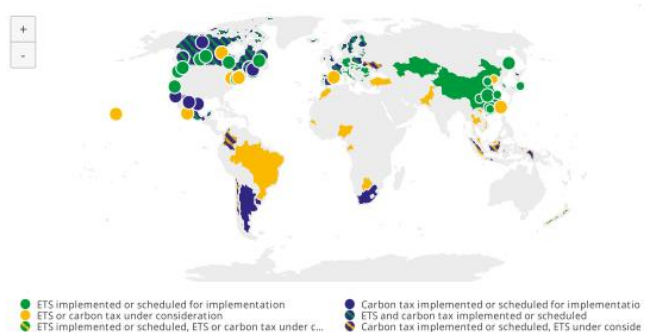
- 5 Day Impact: - 3.50%
- 7 Day Impact: - 2.73%

Impact of carbon stream on share prices

Firms with higher emissions generate higher returns after controlling well-recognized variables that predict returns like book-to-market, momentum, PPE, investment over assets and firm characteristics (Bolton & Kacperczyk, 2021).

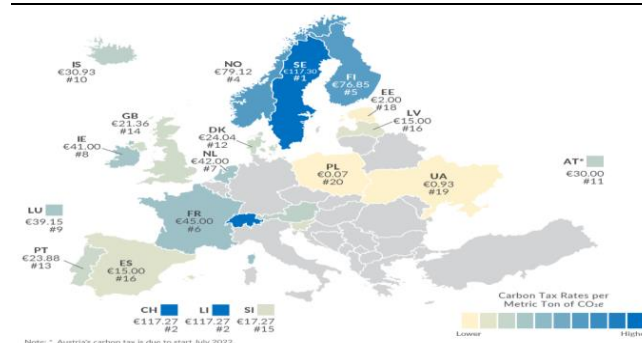
Presently, higher carbon intensity does not result in lower share prices as companies with higher carbon footprint often enjoy higher returns (Bolton & Kacperczyk, 2021). Nonetheless, carbon emission management will soon affect the share prices as firms who are transitioning to cleaner energy and disclose more emission information will experience fewer fluctuations in share price (Hapsoro & Ambarwati, 2018; Breitenstein et al., 2021). In the near future, companies' operations will be impacted by regulations related to carbon emissions, including prices for imports and exports. Hence, it is important to monitor the developments, news, and metrics.

Figure 15: Summary map of regional, national, and subnational carbon pricing initiatives



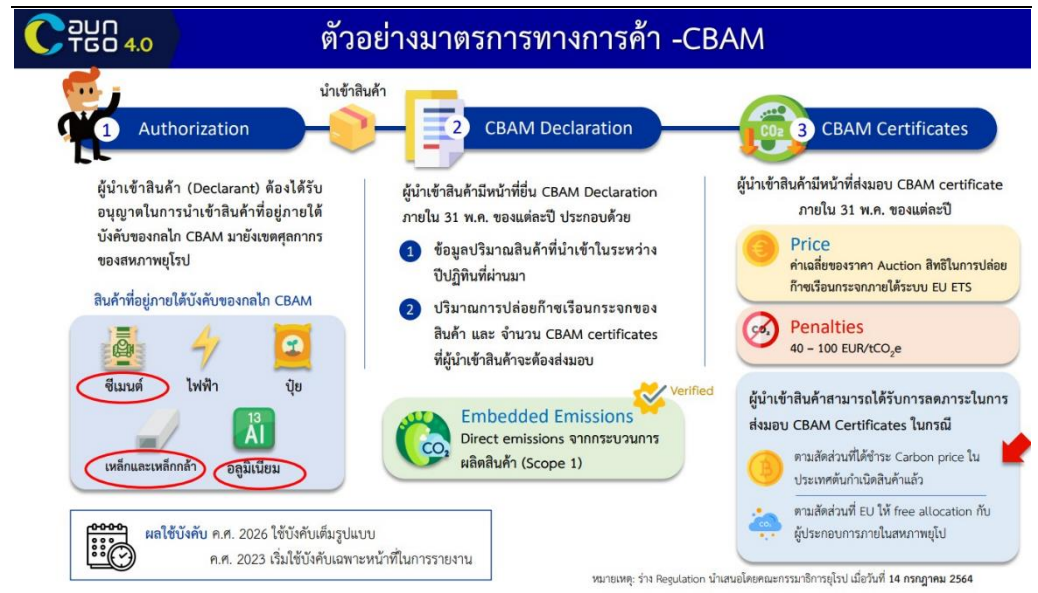
Source: Tax Foundation, KGI Securities Research

Figure 16: Carbon taxes in Europe (as of April 1, 2022)



Source: Tax Foundation, KGI Securities Research

Figure 17: Overwiver of CBAM in the EU



Source: Thailand Greenhouse Gas Management Organization, KGI Securities Research

Figure 18: Development of CBAM in the EU, the US, and China



Source: Bangkokbiznews, KGI Securities Research

Corporate Governance Report of Thai Listed Companies



Companies with Excellent CG Scoring

Stock	Company name	Stock	Company name	Stock	Company name
AAV	ASIA AVIATION	EGCO	ELECTRICITY GENERATING	PTTEP	PTT EXPLORATION AND PRODUCTION
ADVANC	ADVANCED INFO SERVICE	GFPT	GFPT	PTTGC	PTT GLOBAL CHEMICAL
AMA	AMA MARINE	GGC	GLOBAL GREEN CHEMICALS	PYLON	PYLON
AMATA	AMATA CORPORATION	GPSC	GLOBAL POWER SYNERGY	QH	QUALITY HOUSES
ANAN	ANANDA DEVELOPMENT	HANA	HANA MICROELECTRONICS	RATCH	RATCHABURI ELECTRICITY GENERATING HOLDING
AOT	AIRPORTS OF THAILAND	HMPRO	HOME PRODUCT CENTER	RS	RS
AP	ASIAN PROPERTY DEVELOPMENT	INTUCH	SHIN CORPORATION	SCB	THE SIAM COMMERCIAL BANK
BANPU	BANPU	IRPC	IRPC	SCC	THE SIAM CEMENT
BCP	THE BANGCHAK PETROLEUM	IVL	INDORAMA VENTURES	SCCC	SIAM CITY CEMENT
BCPG	BCPG	KBANK	KASIKORNBANK	SEAFCO	SEAFCO
BDMS	BANGKOK DUSIT MEDICAL SERVICES	KCE	KCE ELECTRONICS	SMPC	SAHAMITR PRESSURE CONTAINER
BEC	BEC WORLD	KKP	KIATNAKIN BANK	SPALI	SUPALAI
BEM	BANGKOK EXPRESSWAY AND METRO	KTB	KRUNG THAI BANK	SPRC	STAR PETROLEUM REFINING
BGRIM	B.GRIMM POWER	KTC	KRUNGTHAI CARD	SVI	SVI
BPP	BANPU POWER	LH	LAND AND HOUSES	TACC	T.A.C. CONSUMER
BTS	BTS GROUP HOLDINGS	LPN	L.P.N. DEVELOPMENT	TCAP	THANACHART CAPITAL
CENTEL	CENTRAL PLAZA HOTEL	MAKRO	SIAM MAKRO	THCOM	THAICOM
CK	CH. KARNCHANG	MBK	MBK	TISCO	TISCO FINANCIAL GROUP
CKP	CK POWER	MINT	MINOR INTERNATIONAL	TOP	THAI OIL
CPALL	CP ALL	MTC	MUANGTHAI CAPITAL	TRUE	TRUE CORPORATION
CPF	CHAROEN POKPHAND FOODS	PLANB	PLAN B MEDIA	TTB	TMBTHANACHART BANK
CPN	CENTRAL PATTANA	PSH	PRUKSA HOLDING	VGI	VGI GLOBAL MEDIA
DELTA	DELTA ELECTRONICS (THAILAND)	PTG	PTG ENERGY	WHA	WHA CORPORATION
DTAC	TOTAL ACCESS COMMUNICATION	PTT	PTT	WHAUP	



Companies with Very Good CG Scoring

Stock	Company name	Stock	Company name	Stock	Company name
BAM	BANGKOK COMMERCIAL ASSET MANAGEMENT	GULF	GULF ENERGY DEVELOPMENT	SAPPE	SAPPE
BBL	BANGKOK BANK	JMT	JMT NETWORK SERVICES	SAWAD	SRI SAWAD POWER 1979
CBG	CARABAO GROUP	LPH	LADPRAO GENERAL HOSPITAL	SINGER	SINGER THAILAND
CHG	CHULARAT HOSPITAL	M	MK RESTAURANT GROUP	SPA	SIAM WELLNESS GROUP
COM7	COM7	MAJOR	MAJOR CINEPLEX GROUP	TFG	THAIFOODS GROUP
DOHOME	DOHOME	MEGA	MEGA LIFESCIENCES	TKN	TAOKAENOI FOOD & MARKETING
ERW	THE ERAWAN GROUP	NETBAY	NETBAY	ZEN	ZEN CORPORATION GROUP
GLOBAL	SIAM GLOBAL HOUSE	OSP	OSOTSPA		



Companies with Good CG Scoring

Stock	Company name	Stock	Company name	Stock	Company name
BCH	BANGKOK CHAIN HOSPITAL	ESSO	ESSO (THAILAND)	SF	SIAM FUTURE DEVELOPMENT
BH	BUMRUNGRAD HOSPITAL	HUMAN	HUMANICA	SISB	SISB
EKH	EKACHAI MEDICAL CARE	RBF	R&B FOOD SUPPLY	TPCH	TPC POWER HOLDING

Companies classified Not in the three highest score groups

Stock	Company name	Stock	Company name	Stock	Company name
IIG	I&I GROUP	OR	PTT OIL AND RETAIL BUSINESS	STGT	SRI TRANG GLOVES (THAILAND)
KEX	KERRY EXPRESS (THAILAND)	STEC	SINO-THAI ENGINEERING AND CONSTRUCTION		

Source: www.thai-iod.com

Disclaimer: The disclosure of the survey result of the Thai Institute of Directors Association ("IOD") regarding corporate governance is made pursuant to the policy of the Office of the Securities and Exchange Commission. The survey of the IOD is based on the information of a company listed on the Stock Exchange of Thailand and the Market for Alternative Investment disclosed to the public and able to be accessed by a general public investor. The result, therefore, is from the perspective of a third party. It is not an assessment of operation and is not based on inside information. The survey result is as of the date appearing in the Corporate Governance Report of Thai Listed Companies. As a result, the survey result may be changed after that date or when there is any change to the relevant information. Nevertheless, KGI Securities (Thailand) Public Company Limited (KGI) does not confirm, verify, or certify the accuracy and completeness of such survey result.

Anti-corruption Progress Indicator

Level 5: Extended

Stock	Company name	Stock	Company name	Stock	Company name
ADVANC	ADVANCED INFO SERVICE	GLOBAL	SIAM GLOBAL HOUSE	QH	QUALITY HOUSES
ANAN	ANANDA DEVELOPMENT	GPSC	GLOBAL POWER SYNERGY	RATCH	RATCHABURI ELECTRICITY GENERATING HOLDING
BBL	BANGKOK BANK	HMPRO	HOME PRODUCT CENTER	ROBINS	ROBINSON DEPARTMENT STORE
BCH	BANGKOK CHAIN HOSPITAL	IRPC	IRPC	SCC	THE SIAM CEMENT
BDMS	BANGKOK DUSIT MEDICAL SERVICES	KBANK	KASIKORN BANK	SIRI	SANSIRI
BIGC	BIG C SUPERCENTER	KCE	KCE ELECTRONICS	SPALI	SUPALAI
CK	CH. KARNCHANG	KKP	KIATNAKIN BANK	STEC	SINO-THAI ENGINEERING AND CONSTRUCTION
DCC	DYNASTY CERAMIC	KTB	KRUNG THAI BANK	TCAP	THANACHART CAPITAL
DELTA	DELTA ELECTRONICS (THAILAND)	LPH	LADPRAO GENERAL HOSPITAL	TISCO	TISCO FINANCIAL GROUP
DRT	DIAMOND ROOFING TILES	PACE	PACE DEVELOPMENT CORPORATION	TMT	THAI METAL TRADE
EGCO	ELECTRICITY GENERATING	PTT	PTT	TOP	THAI OIL
GFPT	GFPT	PTTGC	PTT GLOBAL CHEMICAL		

Level 4: Certified

Stock	Company name	Stock	Company name	Stock	Company name
AAV	ASIA AVIATION	ERW	THE ERAWAN GROUP	SAPPE	SAPPE
AP	ASIAN PROPERTY DEVELOPMENT	GLOW	GLOW ENERGY	SAWAD	SRIWAD POWER 1979
BA	BANGKOK AIRWAYS	GUNKUL	GUNKUL ENGINEERING	SCB	THE SIAM COMMERCIAL BANK
BANPU	BANPU	ILINK	INTERLINK COMMUNICATION	SCN	SCAN INTER
BCP	THE BANGCHAK PETROLEUM	KTC	KRUNGTHAI CARD	SEAFCO	SEAFCO
BH	BUMRUNGRAD HOSPITAL	LH	LAND AND HOUSES	SVI	SVI
BJCHI	BJC HEAVY INDUSTRIES	LPN	L.P.N. DEVELOPMENT	TASCO	TIPCO ASPHALT
CBG	CARABAO GROUP	MAKRO	SIAM MAKRO	TKN	TAOKAENOI FOOD & MARKETING
CENTEL	CENTRAL PLAZA HOTEL	MALEE	MALEE SAMPRAN	TMB	TMB BANK
CHG	CHULARAT HOSPITAL	MINT	MINOR INTERNATIONAL	TRT	TIRATHAI
CKP	CK POWER	MODERN	MODERNFORM GROUP	TRUE	TRUE CORPORATION
CPF	CHAROEN POKPHAND FOODS	NOK	NOK AIRLINES	TVO	THAI VEGETABLE OIL
CPN	CENTRAL PATTANA	PTTEP	PTT EXPLORATION AND PRODUCTION		
DTAC	TOTAL ACCESS COMMUNICATION	PYLON	PYLON		

Level 3: Established

Stock	Company name	Stock	Company name	Stock	Company name
BEM	BANGKOK EXPRESSWAY AND METRO	MTLS	MUANGTHAI LEASING	SPRC	STAR PETROLEUM REFINING
CPALL	CP ALL	SCI	SCI ELECTRIC		

No progress

Stock	Company name	Stock	Company name	Stock	Company name
AOT	AIRPORTS OF THAILAND	BPP	BANPU POWER	FN	FN FACTORY OUTLET
BCPG	BCPG	BTS	BTS GROUP HOLDINGS	TPCH	TPC POWER HOLDING

Source: www.ogthailand.org

Disclaimer: The disclosure of the Anti-Corruption Progress Indicators of a listed company on the Stock Exchange of Thailand, which is assessed by the relevant institution as disclosed by the Office of the Securities and Exchange Commission, is made in order to comply with the policy and sustainable development plan for the listed companies. The relevant institution made this assessment based on the information received from the listed company, as stipulated in the form for the assessment of Anti-corruption which refers to the Annual Registration Statement (Form 56-1), Annual Report (Form 56-2), or other relevant documents or reports of such listed company. The assessment result is therefore made from the perspective of a third party. It is not an assessment of operation and is not based on any inside information. Since this assessment is only the assessment result as of the date appearing in the assessment result, it may be changed after that date or when there is any change to the relevant information. Nevertheless, KGI Securities (Thailand) Public Company Limited (KGI) does not confirm, verify, or certify the accuracy and completeness of the assessment result.

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Rating	Definition
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Neutral (N)	The stock's excess return over the next twelve months is ranked in the range between the top 40% and the bottom 40% of KGI's coverage universe in the related market (e.g. Taiwan)
Under perform (U)	The stock's excess return over the next twelve months is ranked in the bottom 40% of KGI's coverage universe in the related market (e.g. Taiwan).
Not Rated (NR)	The stock is not rated by KGI.
Restricted (R)	KGI policy and/or applicable law regulations preclude certain types of communications, including an investment recommendation, during the course of KGI's engagement in an investment banking transaction and in certain other circumstances. Excess return = 12M target price/current price-
Note	When an analyst publishes a new report on a covered stock, we rank the stock's excess return with those of other stocks in KGI's coverage universe in the related market. We will assign a rating based on its ranking. If an analyst does not publish a new report on a covered stock, its rating will not be changed automatically.

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